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G1W A3F A5X
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(56) Documents cited
GB 1516299 GB 0972392 GB 0295000
GB 1473575 GB 0772133
GB 1367142 GB 0743538

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B8C

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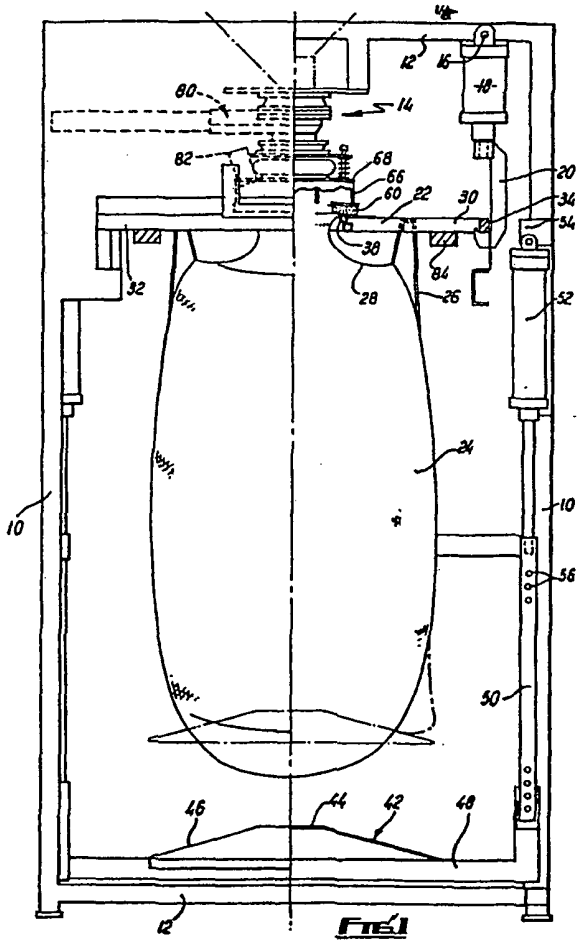
(54) Bag filling apparatus

(57) A bag filling apparatus for relatively large bags (24), say of 1 tonne capacity, includes means (18, 20, 22) for suspending the bag to be filled on the frame (10, 12) of the apparatus and support means (42) which is verticaly movable into and out of contact with the bag base for supporting the base of the bag being filled. The support means (42) may be adjustable (56) to cater for bags of different heights and may vibrate to assist in material settlement. The bag suspension means may be capable of weighing the filled bag by the provision of strain gauges in association with suspension pins (16) or pressure change sensing means associated with cylinders (18) of the bag suspension means. This suspension means may include a removable bag support frame (22) having side members which converge in the direction in which it is intended to be loaded for engagement with suspension hooks (20). The bag mouth which can be passed through and over the support frame (22), can be pressed against a resilient sealing ring (60).



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The drawing(s) originally filed was/were informal and the print here reproduced is taken from a later filed formal copy.

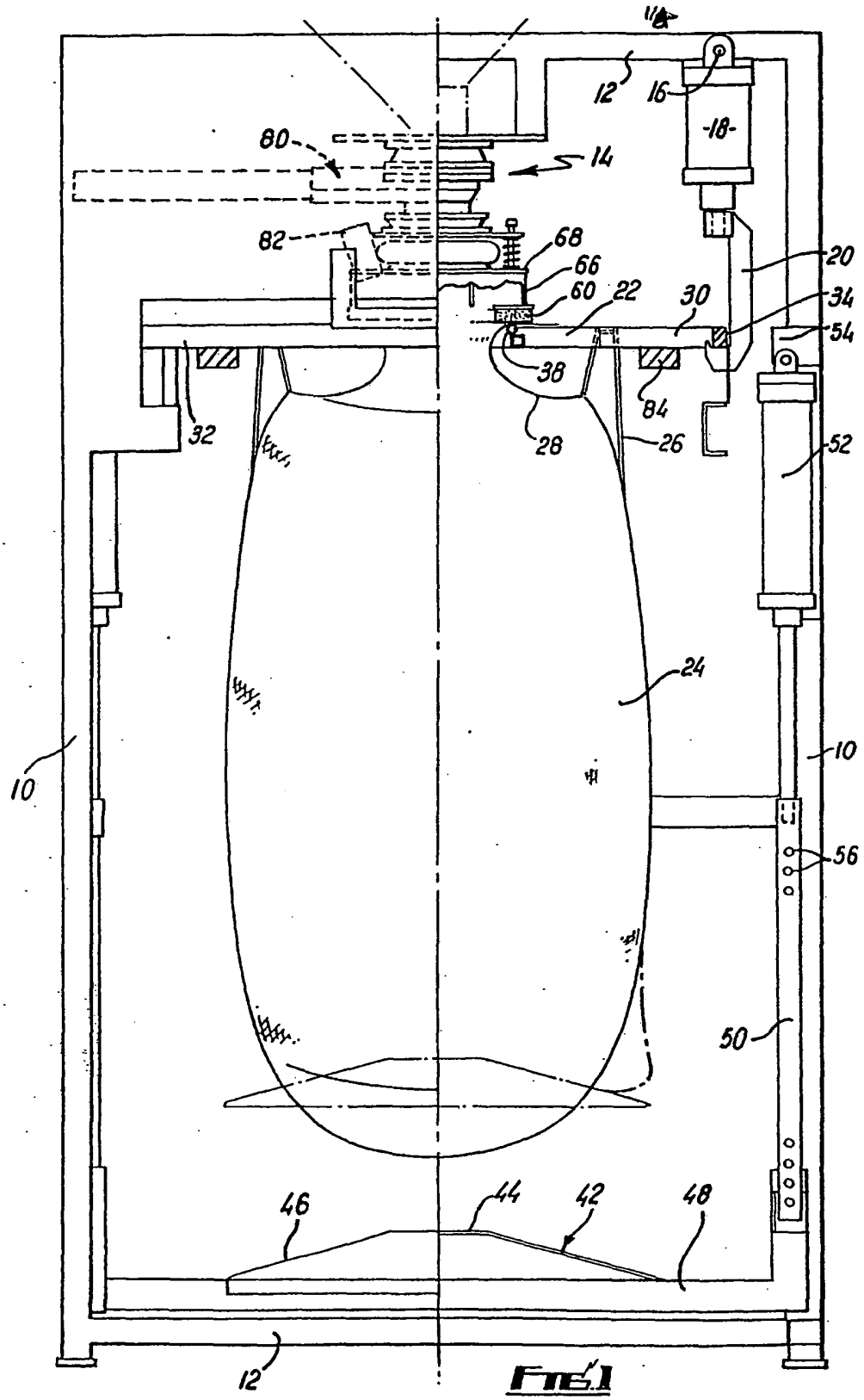
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FIG.1

2/4

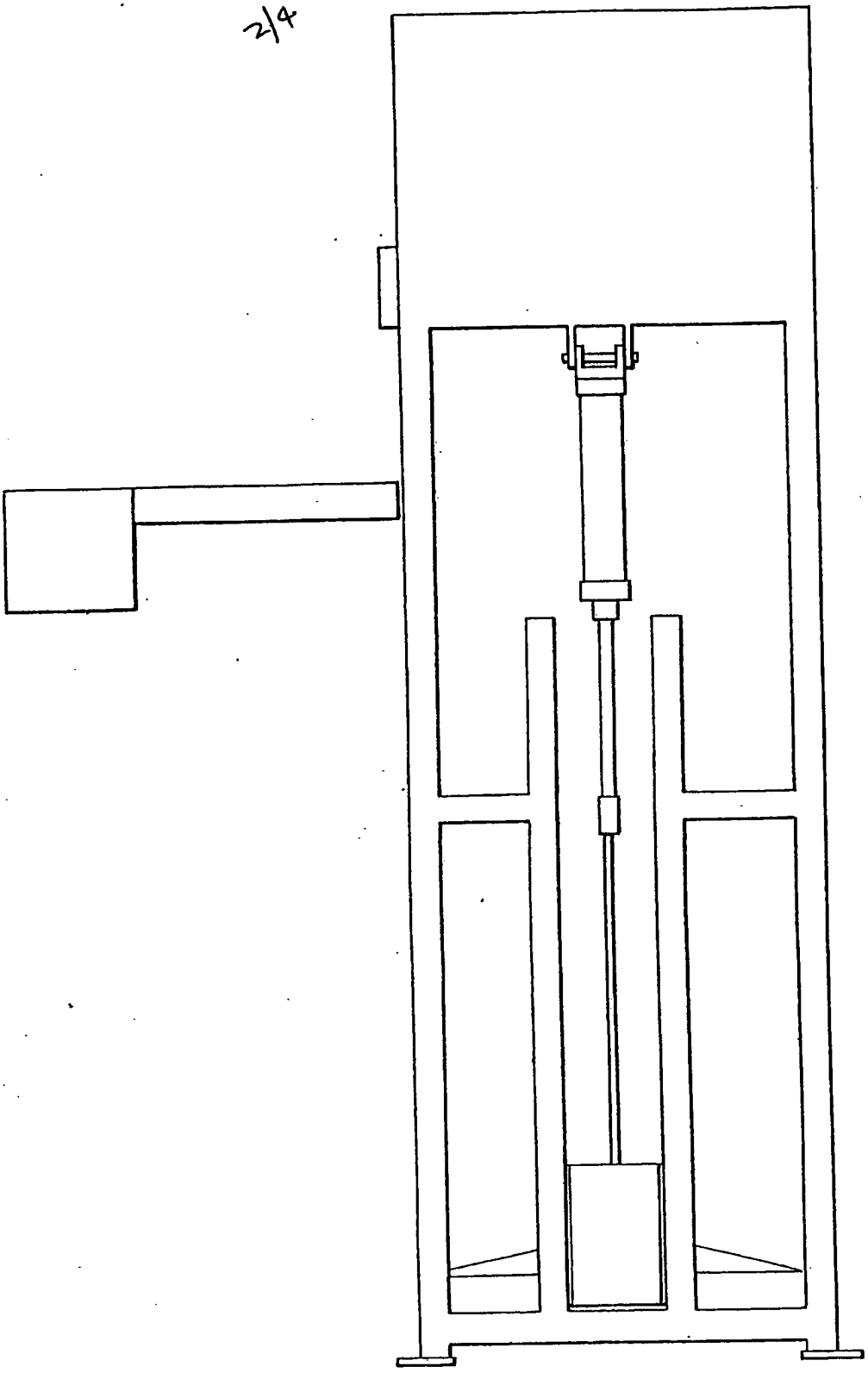
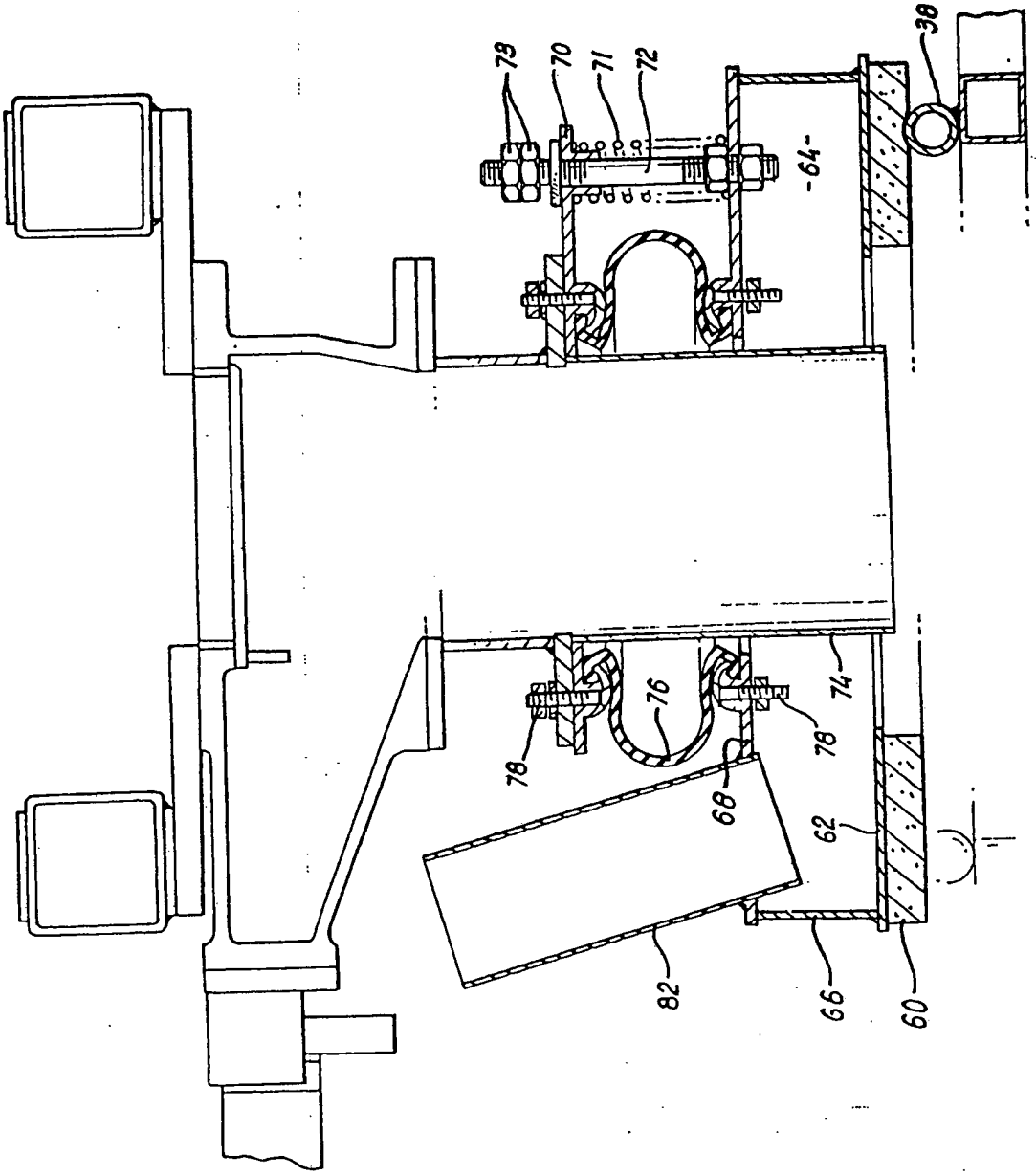


Fig.2



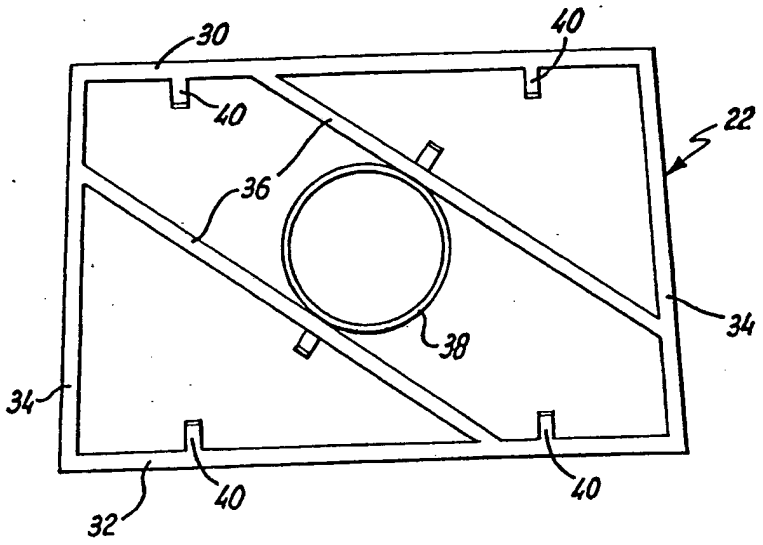


Fig.3

SPECIFICATION

Improvements in or relating to bag filling apparatus

The present invention concerns improvements in or relating to bag filling apparatus, especially but not exclusively apparatus for filling relatively large bags (for example of 1 tonne capacity). The bags may be lined or unlined and in this specification the term bag is used as a generic term embracing a bag and/or its liner.

Apparatus is known for filling such bags but is generally incorporated in relatively large bag filling and handling plant whose cost is in excess of that which is within the reach of relatively small operators.

Currently small operators normally fill large bags utilising a system which is almost entirely manual. The system involves suspending a bag beneath the outlet of a storage hopper, manually opening a discharge valve on the hopper until the bag is filled and closing the valve at the end of the filling operation. This system has numerous disadvantages. If the initial flow of material from the hopper is not carefully monitored and too great a flow of material is discharged there is a danger that the impact load of the material in the bag will damage it. Additionally, any folds on the material of the bag may not be filled and the material therein may not be completely compacted. These latter disadvantages can only be remedied by manually disturbing the bag to allow the contents to settle. A further disadvantage is that the filled bag must then be transported to a weighing apparatus remote from the hopper where its contents are weighed and it will be apparent that problems and inconvenience will arise if the weight of the contents is not at the predetermined value.

If it is over level material has to be removed by hand; alternatively if it is under level the bag must be placed again under the hopper so that more material can be added. Clearly this "hit-or-miss" weighing system is time consuming and when it is realised that the material in the bag could be powder the working conditions in which the operator works can often be uncomfortable or possibly dangerous.

It is an object of the present invention to obviate or mitigate these and other disadvantages.

According to the present invention there is provided a bag filling apparatus comprising a support frame, suspension means on said support frame adapted to carry a bag to be filled, material inlet means for supplying material to be deposited in the bag and a base support for the base of the bag being filled carried by the support frame and mounted for vertical movement into and out of contact with the base of said bag.

Further according to the present invention there is provided a bag filling apparatus comprising a support frame, suspension means on said support frame adapted to carry a bag to be filled and material inlet means for supplying material to be deposited in the bag, said suspension means including a removable bag support frame on which a bag to be filled is mountable, the frame having side members which converge in the direction in which it is loaded into the suspension means.

Another aspect of the present invention provides a bag filling apparatus comprising a support frame, suspension means on said support frame adapted to carry a bag to be filled and material inlet means for supplying material to be deposited in the bag, said suspension means being attached to the framework by pins incorporating strain gauges such that they act as load cells giving an indication of the weight suspended therefrom, from which indication the weight of the contents of a bag to be filled can be determined.

A further aspect of the present invention provides a bag filling apparatus comprising a support frame, suspension means on said support frame adapted to carry a bag to be filled and material inlet means for supplying material to be deposited in the bag and including sealing means to seal the open neck of the bag agaist the suspension means, the said sealing means including an annular resilient member having a substantially horizontal lower face adapted to sandwich the neck of the bag between itself and a bag neck supporting portion of the suspension means.

Preferably the suspension means includes one or more pneumatic or hydraulic piston and cylinder device, and connector members fixed to the piston of said device and capable of receiving said removable bag support frame.

Preferably said support frame includes a central ring through which the neck of the bag to be filled is passed and lugs from which handles of a bag to be filled can be supported.

Preferably a base support for the base of a bag being filled is carried by the framework and is mounted for vertical movement into and out of contact with the base of a bag carried by the suspension means. The base support may include a vibratory assembly to facilitate the compacting of material being filled into the bag.

The means for raising and lowering the base support preferably comprises pneumatic or hydraulic piston and cylinder d vic s interposed betw en a base plate of the base support and th support frame. Connection rods may extend between th piston of thes pistons and cylinder devices and the base plate and may have a plurality of connection points wher by the distanc b tween th pis-

ton ends and the base plate may be varied to acc mm date bags of diff r nt depths.

Means may be provided for causing the piston and cylinder devices of the base support to extend and retract repeatedly on a relatively quick cycle time to shake the bag and its contents so that the contents settle.

Preferably the material inlet means includes a valve movable from a closed position to a first open position which allows a small flow of material to pass into the bag to be filled and a second open position where the valve is fully open to allow a relatively large flow of material into the bag.

Preferably the annular resilient member of the sealing means is mounted on a member which is movable relative to the material inlet means and resiliently biassed downwardly.

The member may comprise two spaced annular plates and an end plate defining an annular chamber, the lower plate carrying the resilient member on its base.

Preferably a bellows connection extends between the said member and a fixed part of the material inlet means. The inlet means preferably includes a downwardly extending tube connected thereto, in communication with the discharge from the valve and extending into the said movable member.

An inlet/exhaust duct may be led into the annular chamber.

An embodiment of the present invention will now be described by way of example only, with reference to the accompanying drawings in which:

Figure 1 shows an elevation, with the right hand side of the drawing in section, of a bag filling and weighing apparatus;

Figure 2 shows a sectional view to a greater scale of a material inlet means of the apparatus; and

Figure 3 shows a plan of a bag support frame of suspension means of the apparatus.

A bag filling and weighing apparatus comprises a framework having four vertical posts 10 connected by top and bottom cross-members 12. The framework is located beneath a material supply for example, a hopper, the outlet from which is connected to material inlet means shown generally by the reference numberal 14. On the top cross-members 12 of the framework there are mounted by means of mounting pins 16 pneumatic piston and cylinder devices 18 to the ends of the pistons of which are pivoted connector members 20 in the form of hooks. The pins, piston and cylinder devices and hooks tog ther with a removable bag support frame 22, illustrated in Fig. 3, combine to form a suspension means for a bag 24 to be filled and weighed by th apparatus, the bag having suspension handl s 26 firmly fixed near its neck 28.

The support frame 22 comprises front and rear tubular m mbers 30, 32 side members 34 which converge towards the front m mber 30 and diagonal m mbers 36 which support at the centr of the framework a bag neck support ring 38. Two lugs 40 are provided on each of the front and rear members, 30, 32 and during the filling operation support the handles 26 of a bag being filled.

As the bag is being filled its lowe end may be supported by a base support 42 which has a raised central plate 44 and a downwardly inclined peripheral plate 46, the support being carried by a bottom member 48 suspended by connection rods 50 to the pistons of two further piston and cylinder devices 52 mounted on a cross-member 54 extending between the uprights 10.

A plurality of connection points 56 are provided in the connection rod 50 such that the height of the base support 44 can be varied to suit bags of different depths. A vibrator may be connected to the central plate 44 to assist in compacting material in the bag during filling.

The material inlet means 14 is shown in detail in Fig. 2. It comprises a resilient annular sealing ring 60 whose lower face is substantially horizontal and which, in use, is adapted to sandwich the neck 28 of a bag or liner to be filled between itself and the ring 38 of the support frame. The ring 60 is attached to an annular plate 62 which forms the open base of an annular chamber 64 further defined by a side plate 66 and a top plate 68. The chamber 64 is suspended from a fixed plate 70 of the inlet means on studs 72, a compression spring 74 being interposed between the plates 68 and 70 around each stud to spring bias the chamber 64 and thus the resilient sealing ring 60 downwardly against the bag support ring 38. Nuts 78 on the studs may adjust the spring loading. A filling tube 74 is attached to and depends downwardly from the plate 70 into the opening in the annular plate 62 and to provide a gas-tight seal between the chamber 64 and the plate 70 there is provided a resilient bellows member 76 attached to the plates 68 and 70 by bolts 78. Upstream of the plate 70 the inlet means includes a pneumatically operated slide valve shown diagrammatically in Fig. 1 but not in Fig. 2 and having the general reference numeral 80. The valve may be moved from a closed position to a first partially open position in which a trickle feed of material is passed to the bag, a second or fully open position permitting a full flow of material to the bag.

The pins 16 supporting the piston and cylinder d vic s 18 of the suspension assembly are provid d with strain gauges so that they form load cells th signals from which can be taken to electronic apparatus which translates the signals to weight r adings so that any weight susp nded from the pins 16 will be indicated on a suitable indicating devic convenient to the remote valve

operating means.

An inlet/exhaust pipe 82 leads into the chamber 64 and is provided with valve means (not shown) whereby air may be injected into the chamber and thus the bag being filled to inflate it to remove folds prior to filling or alternatively to allow air to exhaust therefrom during filling.

Electronic, pneumatic and hydraulic control arrangements may be applied to the apparatus so that the filling of a bag may be carried out automatically,

In operation the apparatus functions as follows.

. At a site remote from the apparatus a bag support frame 22 has a bag suspended therefrom by passing its handles 26 over the lugs 40 and its neck or liner neck through the neck support ring 38. The frame is supported on the forks (shown at 84 on Fig. 1) of a forklift truck which then raises the frame and bag to the appropriate height and advances it into the apparatus with the bar 30 foremost so that the frame can be taken up by the connector hooks 20 on the piston and cylinder devices 18 as a result of the convergence of the side members of the frame. The bag and frame are then raised by the piston and cylinder devices 18 until the neck 28 of the bag is sandwiched in a gas-tight manner between the support ring 38 and the annular resilient seal ring 60. The weight indicator connected to the pins 16 can then be zeroed and air is admitted through the tube 82 to fill the bag and remove any folds therefrom. At this stage the pistons of the piston and cylinder device 52 can be retracted to bring the bag support plate up to the position shown in phantom lines in Fig. 1 whereby the base of the bag is supported. Thereafter the valve 18 may be open to the trickle feed position so that an initial charge of material is gently supplied to the bag by way of the tube 74 filling the base and lower corners of the bag. After an initial feed period the valve 80 can be fully opened to allow full flow of material into the bag. At this time the valve means in the tube 82 is open to allow exhaust of air from the bag to accommodate the increasing volume of material therein. During this filling operation the weighing arrangement may be monitoring the weight of the contents of the bag and when the weight is approaching the predetermined value the valve 80 can be returned to the trickle feed so that the final filling of the bag which is achieved when the weighing apparatus detects the exact weight of material required can be carefully controlled.

The frame and filled sack can then b unloaded by lowering the bag support 44 by extending th pistons of the pair of piston and cylinders 52 and th reafter lowering th support frame 22 by extending the pistons of the piston and cylinder d vic s 18. The forklift truck is th n advanced to position its forks under the frame and, with the neck of th bag 28 out of contact with the sealing ring 60 the bag and frame can be removed. Another bag filling operation can then be commenced.

It will be apparent that the apparatus may be automatically controlled once a manual start command has been given, normally when the support frame has been positively located in the apparatus and detection means, for example a trip switch, have confirmed that it is in the correct location. At this stage the cylinders 18 are actuated to raise the frame and bag by a distance sufficient to trip a limit switch. This zero load is entered into the weighing system and the valve in the inlet/exhaust pipe 82 is arranged to supply air from a fan to the interior of the bag. After predetermined delay the fan is switched off and the pistons operating the bag support are actuated to raise the support to its raised position at which point a further trip switch signal the valve 80 to discharge the first load of material into the bag. At ths stage the vibrator in the bag support 40 may be actuated. The cylinders for the bag support plate may be reciprocated during the filling cycle which takes place with the valve 80 fully open. When the weighing system has detected a 90% load in the bag the vibrator may be switched off and the valve 80 changed to the dribble feed position until a signal is received from the weighing system indicating 100% load in the bag at which stage the valve is closed. The cylinders are then actuated to lower the bag and support frame to the lowest position at which the trip switch signals the end of the operation and a signal may be given to alert the forklift truck driver so that he may move the filled bag and its support frame from the apparatus.

Various modifications can be made without departing from the scope of the invention. For example the material inlet means can assume different configurations, the weighing arrangement can be differently arranged, for example by sensing pressure changes in the cylinders 18 and the bag support may take any suitable form.

In a simplified arrangement the bag support frame is dispensed with and the bag handles are suspended directly on the hooks of the connector members 20. In this modification the piston and cylinder devices 18 may be repositioned. The bag or liner neck in this modification may be manually clamped around the inlet means.

In a further modification two frame members of square or rectangular xternal configuration may be vertically removably mounted on a wheeled frame running on guide rails xtending transversely of th apparatus beyond each side of th support posts 10.

A walkway is arranged al ngside the apparatus at a convenient height so that an op rative may position a bag on an mpty support

frame to one side of the apparatus, thereafter causing the wheeled assembly to move transversely along its rails to bring said support frame loaded with a preferably pre-inflated bag into position beneath the material inlet means at which the hooks in the connector members 20 take up the frame to bring the bag into contact with the inlet means at which stage filling operation can commence. It will be realised that the support frame on the wheeled assembly alongside the aforementioned support frame now under the filling means will now be lying alongside the other side of the machine so that a filled bag thereon can be removed with the operative's aid who may then fit a new empty bag and inflate the bag prior to the movement of the wheeled assembly in the direction opposite to that described above after the first bag has been filled to move said bag to the other side of the machine ready for unloading while the new bag is being filled. It will be realised that with this modification bag inflation means may be necessary on each side of the machine and that the reciprocation of the wheeled assembly can be achieved by further piston and cylinder devices.

In a still further modification a vibrator may be dispensed with where its action enhanced by causing the bag base support to rise and fall relatively quickly so that the contents of the bag settle.

CLAIMS

1. Bag filling apparatus comprising a support frame, suspension means on said support frame adapted to carry a bag to be filled, material inlet means for supplying material to be deposited in the bag and a base support for the base of the bag being filled carried by the support frame and mouted for vertical movement into and out of contact with the base of the bag.

2. Bag filling apparatus as claimed in claim 1, in which the suspension means includes one or more pneumatic or hydraulic piston and cylinder devices and connector members fixed to the piston of said device and capable of receiving said removable bag support frame.

3. Bag filling apparatus as claimed in claim 1 or claim 2, in which the base support for the base of a bag being filled is carried by the framework and is mounted for vertical movement into and out of contact with the base of a bag carried by the suspension means.

4. Bag filling apparatus as claimed in any one of claims 1, 2 or 3, in which th base support includes a vibratory assembly to facilitat the compacting of material being filled into the bag.

5. Bag filling apparatus as claimed in any one of the preceding claims, in which the means for raising and lowering the base support comprises pneumatic or hydraulic piston and cylinder devices interposed between a base plate of the base support and the support frame.

6. Bag filling apparatus as claimed in claim 5, in which connection rods between the piston of the said piston and cylinder devices and the base plate have a plurality of connection points whereby the distance between the piston ends and the base plate may be varied to accommodate bags of different depths.

7. Bag filling apparatus as claimed in claim 5 or claim 6, in which means are provided for causing the piston and cylinder device of the base support to extend and retract repeatedly on a relatively quick cycle time to shake the bag and its contents so that the contents settle.

8. Bag filling apparatus as claimed in claim 1 or claim 2, in which said suspension means include a removable bag support frame on which a bag to be filled is mountable, the frame having side members which converge in the direction in which it is loaded into the suspension means.

9. Bag filling apparats as claimed in claim 8, in which said bag support includes a central ring through which the neck of the bag to be filled is passed and lugs from which the handles of a bag to be filled can be supported.

10. Bag filling apparatus as claimed in any one of the preceding claims, in which said suspension means are attached to the framework by pins incorporating strain gauges such that they act as load cells giving an indication of the weight suspended therefrom, from which indication the weight of the contents of a bag to be filled can be determined.

11. Bag filling apparatus as claimed in any one of the preceding claims, in which the material inlet means includes a valve movable from a closed position to a first open position which allows a small flow of material to pass into the bag to be filled and a second open position where the valve is fully open to allow a relatively large flow of material into the bag.

12. Bag filling apparatus as claimed in any one of the preceding claims, including sealing means to seal an open neck of the bag against the suspension means, the said sealing means including an annular resilient member having a substantially horizontal lower face adapted to sandwich the neck of the bag between itself and a bag neck supporting portion of the suspension means.

13. Bag filling apparatus as claimed in claim 12, in which th annular resilient member of th sealing means is mounted on a memb r which is movable relative to the mat rial inlet m ans and resiliently biassed downwardly .

14. Bag filling apparatus as claimed in claim 13, in which the said member com-

prises two spaced annular plates and an end plate d fining an annular chamber, the lower plate carrying the resilient member on its base.

15. Bag filling apparatus as claimed in claim 13 or claim 14, in which a bellows connection extends between the said member and a fixed part of the material inlet means.

16. Bag filling apparatus as claimed in any one of claims 13 to 15, in which the inlet means includes a downwardly extending tube connected thereto, in communication with the discharge from the valve and extending into the said movable member.

17. Bag filling apparatus as claimed in any one of claims 14 to 16, in which an inlet/exhaust duct leads into the annular chamber.

18. Bag filling apparatus comprising a support frame, suspension means on said support frame adapted to carry a bag to be filled and material inlet means for supplying material to be deposited in the bag, said suspension means including a removable bag support frame on which a bag to be filled is mountable, the frame having side members which converge in the direction in which it is loaded into the suspension means.

19. Bag filling apparatus comprising a support frame, suspension means on said support frame adapted to carry a bag to be filled and material inlet means for supplying material to be deposited in the bag, said suspension means are attached to the framework by pins incorporating strain gauges such that they act as load cells giving an indication of the weight suspended therefrom, from which indication the weight of the contents of a bag to be filled can be determined.

20. Bag filling apparatus comprising a support frame, suspension means on said support frame adapted to carry a bag to be filled and material inlet means for supplying material to be deposited in the bag and including sealing means to seal an open neck of the bag against the suspension means, the said sealing means including an annular resilient member having a substantially horizontal lower face adapted to sandwich the neck of the bag between itself and a bag neck supporting portion of the suspension means.

21. Bag filling means substantially as hereinbefore described with reference to the accompanying drawings.

22. Any novel subject matter or combination including novel subject matter herein disclosed, whether or not within the scope of or relating to the sam invention as any of the preceding claims.

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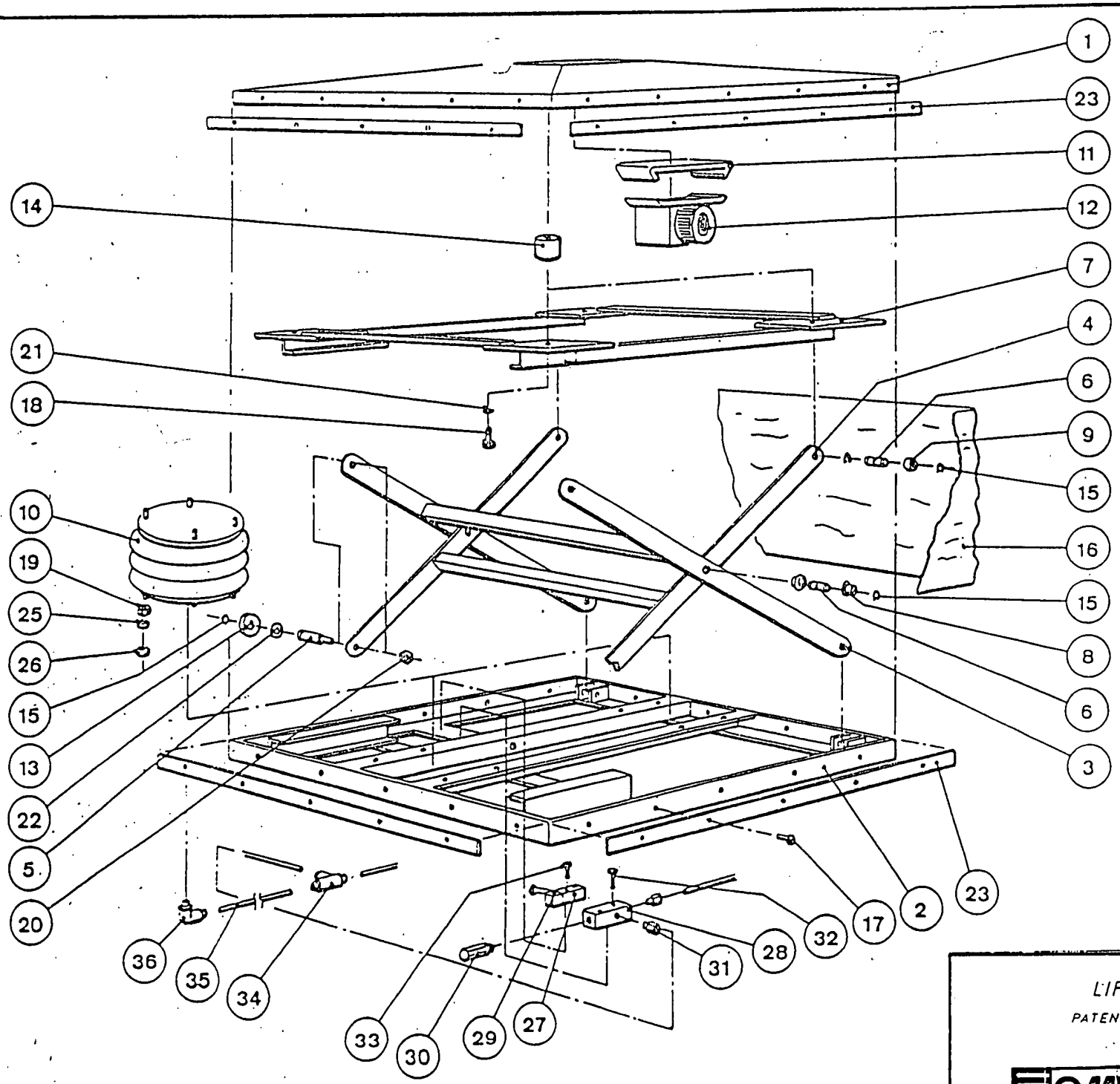


FLOMAT
Dry Solids Materia
Handling Systems
Flomat Limited
Unit 2, Peakdale Road,
Brookfield, Glossop,
Derbyshire SK13 9LQ
Tel: Glossop 4102 Telex: 6666

I.C.I ITEM Nº.
P1-083.

LIFT TABLE
PATENTED PRODUCT
FROM
FLOMAT Ltd. Glossop
831283

SUB SECTION 5G

VIBRATING LIFT TABLE (STATION II)

(DRG NO. 831283)
(I.C.I. ITEM NO. P1-083)

MANUFACTURER:	Flomat Limited, Unit 2, Peakdale Road, Glossop Derbyshire
OVERALL DIMENSIONS:	910 mm x 910 mm x 295 mm min. height.
VIBRATOR:	Vipac model EV10.
MOTOR:	250 w input power, 415 v, 3 ph, 50 c speed 2750 rpm
PERFORMANCE:	Max. centrifugal force 2450 newcons Dunlop pneuride.
LIFTING SOURCE:	2 x air rides (10 x 3) operating pressure 3 bar
MAX. LIFT HEIGHT:	400 mm
SCISSOR ARMS:	40 X 15 mm flat mild steel
PIVOT PINS:	20 mm dia. x 25 mm long
BUSHES:	Flanged 'oilite' 20 mm bore x 25 mm O/D
PNEUMATIC VENT VALVE:	Bosch No. 0821 002002
EXHAUST SILENCER:	Bosch No. 1010 ¾" BSP

36	2	Angular connection	Logic	3109 1221	176
35		Hose	Logic	Ø 12	196
34	1	Joint connection	Logic	3104 1200	177
33	2	Screw		MCS 5x15	247
32	2	Screw		MCS5x50	246
31	2	Connection	Logic	3101 1221	175
30	1	Sounddamper	Bosch	1010 3/4"	182
29	1	Limitposition turn	Storel	XC2 JC	138
28	1	Quick venting	Bosch	0821 002 002	181
27	1	Limitpos. turnmiss.	Storel	ZC2 JE01	137
26	16	Screw nut		Loc-king 10	271
25	16	Spring plate		FBH 10,2	258
24	16	Spring plate		FBH 8,2	259
23	8	Flange		821143	59
22	4	Plate		830331	99
21	4	Spring plate		FBH 12,2	257
20	4	Screw nut		Loc-king M12	273
19	16	Screw nut		M6M 10	268
18	4	Screw		M6S 12x14	221
17	40	Screw threadpressed		M6SF - TT 6x12	245
16	1	Cloth	PV		136
15	16	Seegerfuse		SgA 15	254
14	4	Vibration damper	Trelleborg	A75/48 - A	135
13	4	Bearing	SKF	" 6302 - 2RS	157
12	1	Vibrator	VIPAC	" EV10	126
11	1	Vibrator hold	VIPAC	" 10102800	127
10	2	Compressed airbellow			180
9	4	Bushing	SMS 777	2991 15/21x15	158
8	4	Flange bearing	SMS 779	2992 15/21x25 - 27x3	159
7	1	Frame top		820822	29
6	6	Shaft		" 821304	86
5	4	Bearing neck		" 821314	87
4	1	Scissorarm inside		" 820832	30
3	1	Scissorarm outer		" 820842	31
2	1	Bottomframe		" 820852	32
1	1	Vibratingtable		" 820862	33

Lifttable

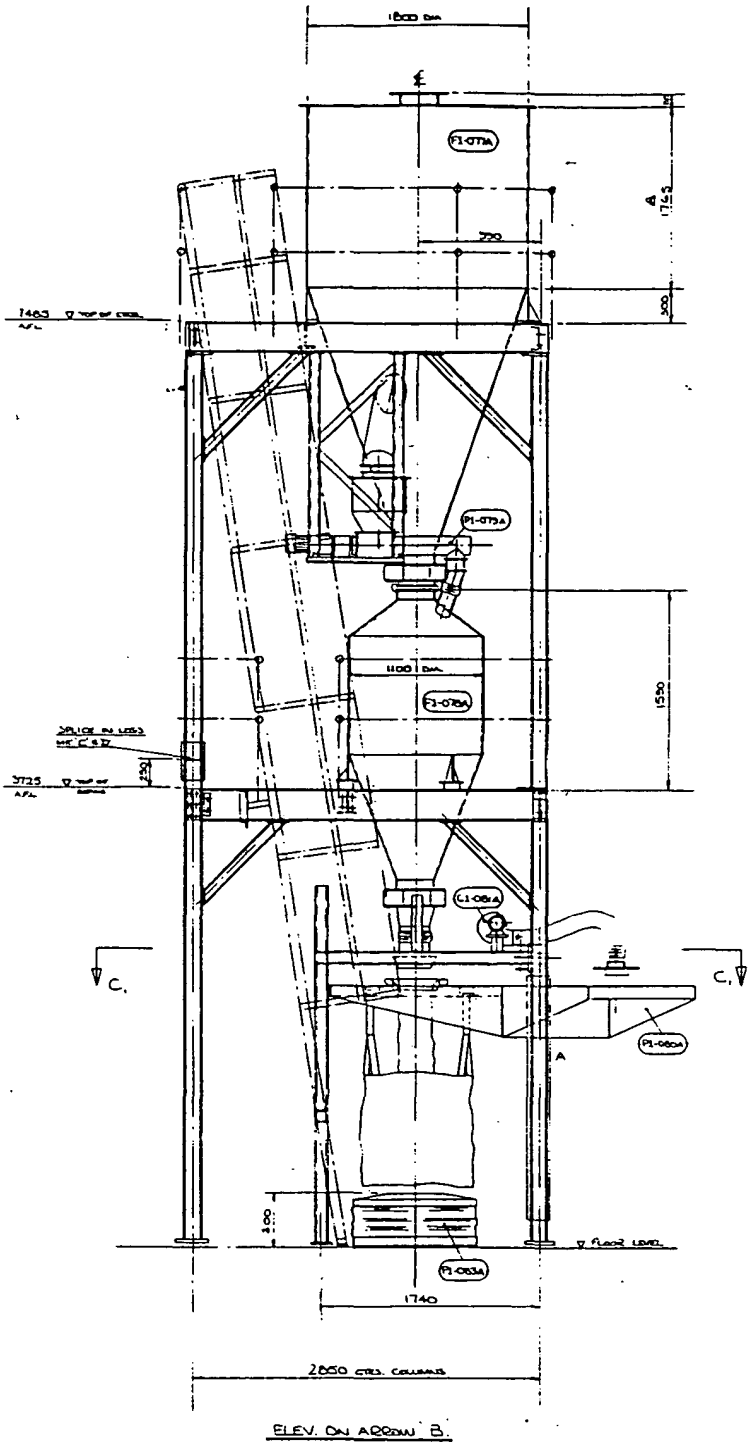
Draw.no. 830351

830344

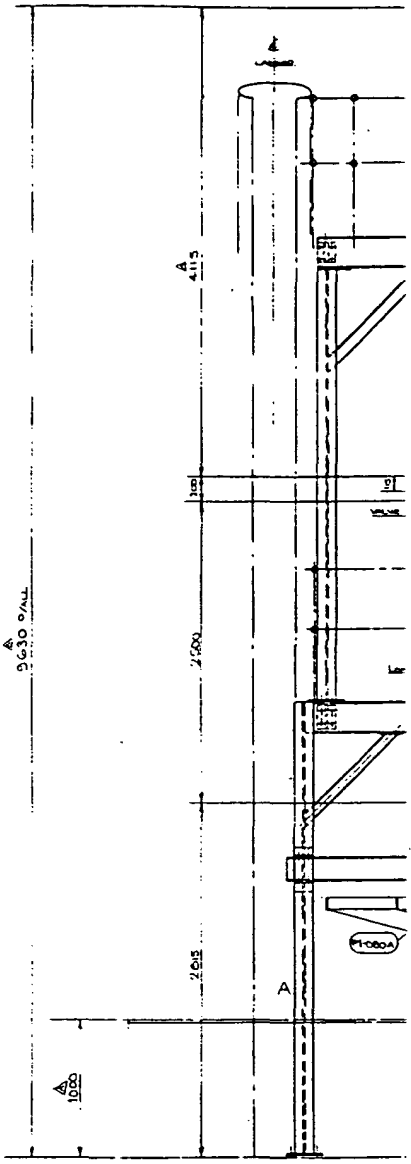
FLOMAT

Dry Solids Materials

Flomat Limited
Unit 2, Peakdale Road,
Brookfield, Glossop,
Derbyshire SK13 9LQ



ELEV. ON ARROW B.

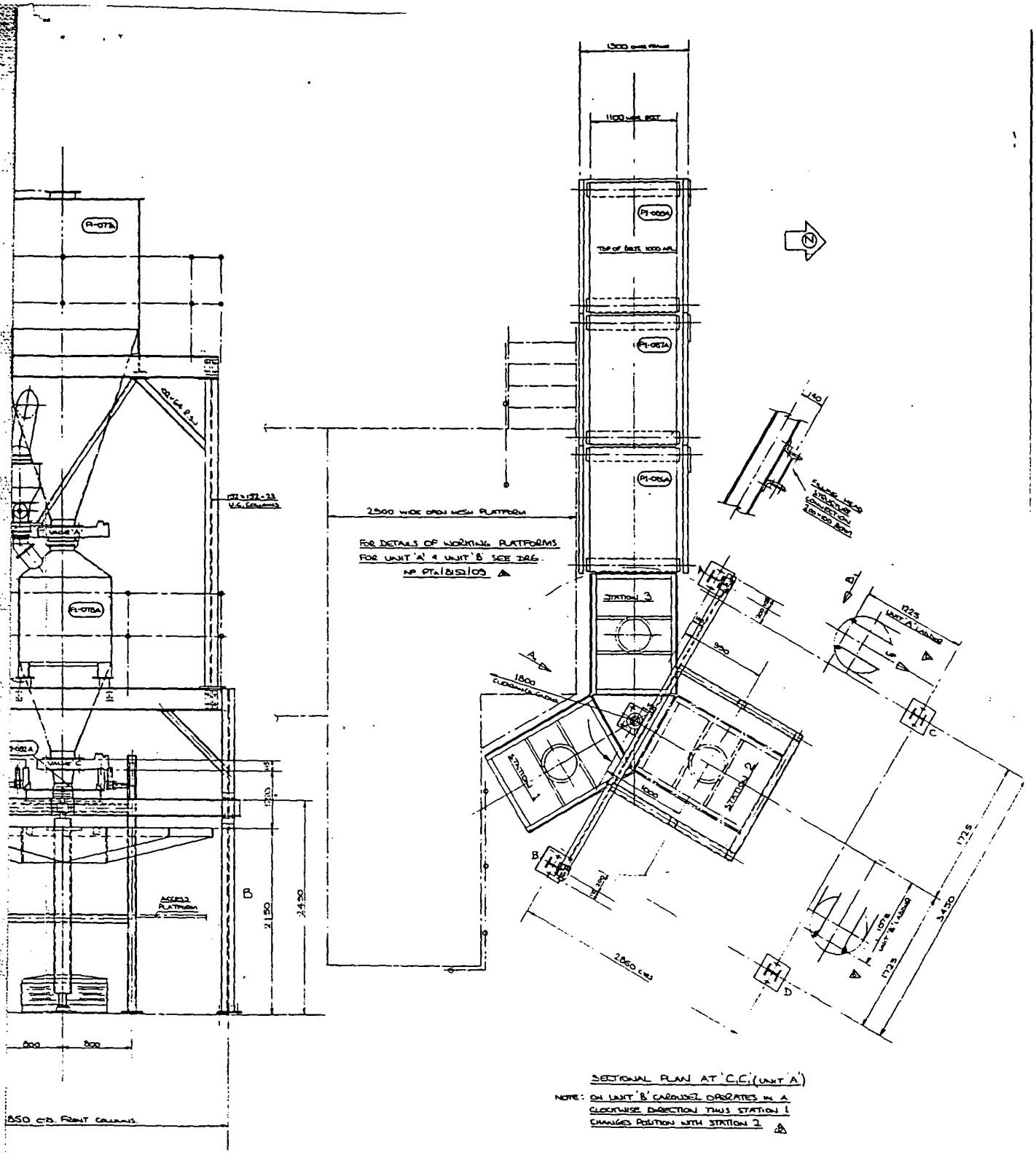


ELE

GENERAL ARRANGEMENT — IMPROVI

FIOMAT Ltd. Glossop

AMENDMENTS



SECTIONAL PLAN AT 'C.C.' (UNIT 'A')

NOTE: ON UNIT 'B' CARRIAGE OPERATES IN A CLOCKWISE DIRECTION THUS STATION 1 CHANGES POSITION WITH STATION 2

...N ON ARROW 'A'

...P.T.A. BAG FILLING PLANT - ...NORTH UNIT (ITEM NO P1-078 A) SOUTH UNIT (ITEM NO P1-078 B)

	CONTRACT			FLOMAT LTD.	
	DRAWN	DATE	25 June '84	DESCRIPTION: GENERAL ARRANGEMENT PTA BAG FILLING PLANT	DRAWING No: PTA/BIS2
	CHECKED	SCALE	1:20		